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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:) Docket No: SUNMP099
)
Sutera, et al.) Group Art Unit: 2128
)
Application No: 09/430,350) Examiner: Jones, H.
)
Filed: October 29, 1999) Date: June 7, 2004
)
For: METHOD FOR REDUCING NOISE IN)
INTEGRATED CIRCUIT LAYOUTS)

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Neely J. Entwistle
Neely J. Entwistle

**TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION -- 37 CFR 192)**

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This application is on behalf of:

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<u>Months</u>	<u>Large Entity</u>	<u>Small Entity</u>
<input type="checkbox"/> one	\$110.00	\$55.00
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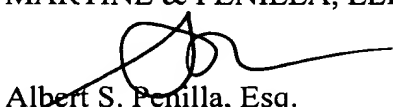
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Notice of Appeal Fee	\$ <u>330.00</u>
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PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

EX PARTE SUTERA ET AL.

Application for Patent

Filed October 29, 1999

Application No. 09/430,350

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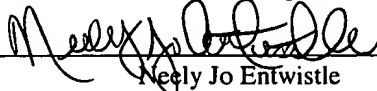
FOR:

**METHOD FOR REDUCING NOISE IN
INTEGRATED CIRCUIT LAYOUTS**

APPEAL BRIEF

CERTIFICATE OF MAILING

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Neely Jo Entwistle

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**MARTINE & PENILLA, LLP
Attorneys for Applicant**

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APPENDIX A - CLAIMS ON APPEAL

I. REAL PARTY IN INTEREST

The real party in interest is Sun Microsystems, Inc., the assignee of the present application.

II. RELATED APPEALS AND INTERFERENCES

The undersigned is not aware of any related appeals and/or interferences.

III. STATUS OF THE CLAIMS

A total of 48 claims were presented during prosecution of this application. Claims 9-13, 18-24, 26, 31-35, 40-46, and 48 were cancelled during prosecution of this application. The Applicants appeal rejected claims 1-8, 14-17, 25, 27-30, 36-39, and 47.

IV. STATUS OF THE AMENDMENTS

A request for continued examination (RCE) was filed February 3, 2003. The application was originally filed on October 29, 1999. All amendments have been entered, leaving rejected claims 1-8, 14-17, 25, 27-30, 36-39, and 47.

V. SUMMARY OF THE INVENTION

A method for reducing noise in an integrated circuit is described. The method includes choosing a net within the integrated circuit to evaluate for potential noise problems. (p. 6, first ¶) The method also includes determining a total conductor path length connected to a first driver within the net. (p. 5, second full ¶) A noise amplitude versus conductor path length curve for the first driver within the net is then examined to determine whether the total conductor path length connected to the first driver corresponds to an unacceptable noise level

within the net. (p. 6, second ¶) If the noise amplitude versus conductor path length curve indicates that a noise level associated with the total conductor path length and first driver is unacceptable, the method includes different embodiments to resolve the unacceptable noise level condition. (pp. 6-7)

In one embodiment, the noise amplitude versus conductor path length curve for the first driver is further examined to determine an acceptable conductor path length for the first driver that corresponds to an acceptable noise level within the net. (p. 6, second ¶) Further, in accordance with this embodiment, the method requires a second driver to be inserted within the net at a location that will cause the total conductor path length connected to the first driver to be less than or equal to the acceptable conductor path length. (p. 7)

In another embodiment, a noise amplitude versus conductor path length curve for a second driver is examined, wherein the second driver is stronger than the first driver. (p. 6, second and third ¶) If the noise amplitude versus conductor path length curve for the second driver indicates that the noise level associated with the total conductor path length is acceptable, the method requires replacement of the first driver with the second driver. (p. 6, second and third ¶)

Thus, the method of the present invention provides for correcting potentially noisy circuit layouts at the place and route stage during the process of converting an electronic design into a physical circuit layout. (p. 4, first ¶) Using the present invention, each net is individually analyzed to determine whether it is likely to have more than an acceptable level of noise coupled to it from external sources. (p. 4, fourth ¶) External sources are considered to be anything other than net components such as driver/receiver combinations or drivers or receivers individually. (p. 4, fourth ¶)

In the present invention, noise analysis is performed using noise amplitude vs. length of conductive path curves for various drivers. (p. 5, first full ¶) For each conductive path, there is a given amount of noise that can be tolerated, depending on what is being accomplished by signals on that conductive path. (p. 5, second full ¶) It is up to the circuit designer to determine what the acceptable levels of noise will be on the various types of conductive paths being used in a given design. (p. 5, second full ¶)

Figure AB-1 is an illustration showing exemplary noise amplitude vs. length of conductive path curves for various drivers of different strength. (Fig. 2 and associated text) A point at which an acceptable noise line 40 intersects with a driver noise amplitude line determines the maximum length of conductive path that may be between the driver and a receiver without any intervening circuitry such as buffers or other circuits. (p. 5, second full ¶) In one example, a driver represented by a curve 58 may have been originally chosen for the physical layout. (p. 6, third ¶) Suppose in this example, a point 60 on curve 58 represents the length of conductive path being analyzed. (p. 6, third ¶) Point 60 is above the acceptable noise line 40. (p. 6, third ¶) However, curves 62 and 64, representing stronger drivers, for the same length of conductive path would result in acceptable noise levels as represented by points 66 and 68, respectively. (p. 6, third ¶)

Figure AB-2 is an illustration showing an exemplary method for reducing noise in a circuit, in accordance with one embodiment of the present invention. (Fig. 3 and associated text) The method includes an operation 50 in which a net is chosen for analysis. (p. 6, first ¶) In an operation 52, a determination is made as to whether the net chosen in operation 50 is likely to exceed the acceptable noise levels. (p. 6, second ¶) The determination of operation 52 is performed using the noise amplitude vs. length of conductive path and the acceptable noise

level for the circuit. (p. 6, second ¶) A decision operation 54 is provided to direct the method based on the determination of operation 52. (p. 6, second ¶) If the chosen net is likely to exceed maximum acceptable noise levels, the method proceeds with an operation 56. (p. 6, second ¶) Otherwise, the method is completed. (Fig. 3)

In the operation 56 a determination is made as to whether a larger driver is available to solve the noise problem. (p. 6, second ¶) If operation 56 determines that a larger driver is available, the method proceeds to an operation 58 in which the larger driver is chosen to replace the existing weaker driver, thus solving the noise problem of the net. (p. 6, second ¶) If operation 56 determines that a larger driver is not available, the method proceeds to an operation 70. (p. 7, first ¶)

In the operation 70, a driver (i.e., buffer) is placed at a location that would increase signal levels on the net. (p. 7, first ¶) Locations where drivers are placed may be thought to be locations where the previous net ends and a new net begins. (p. 7, first ¶) Thus, a driver is placed at a location causing the total conductive path extending from the original driver of the net to be less than or equal to the maximum length of conductive path allowed to achieve an acceptable noise level, as determined through examination of the noise amplitude vs. length of conductive path curve. (p. 7, first ¶)

Following the operation 70, the method proceeds with a decision operation 96 for determining whether the noise criteria for the net is satisfied by insertion of the driver. (p. 9, second full ¶) If the noise criteria for the net is satisfied, the method is completed. (Fig. 3) If the noise criteria for the net is not satisfied, the method reverts back to operation 70 to determine where to place another driver within the net to further reduce the noise on the net. (p. 9, second full ¶ and Fig. 3)

When determining where to place a driver in the operation 70, it is important to recognize that the total conductive path length includes all conductive path segments leaving a given driver, including all intersecting paths. (p. 7, third ¶) Thus, it is desirable to determine whether there are timing issues associated with conductive path segments that would suggest insertion of the driver on a particular conductive path segment. (p. 7, third ¶)

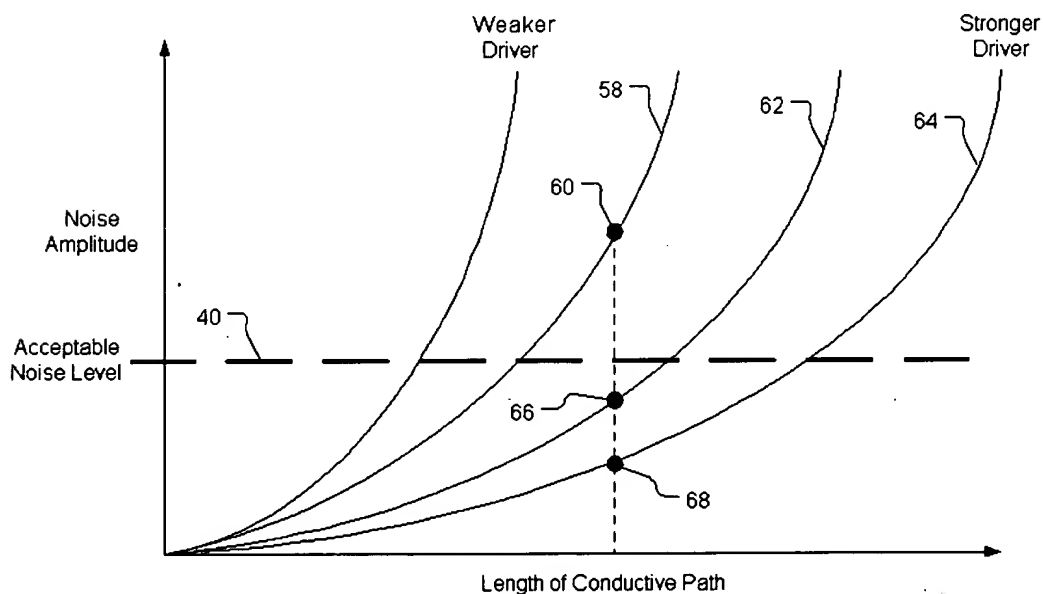


Fig. AB-1

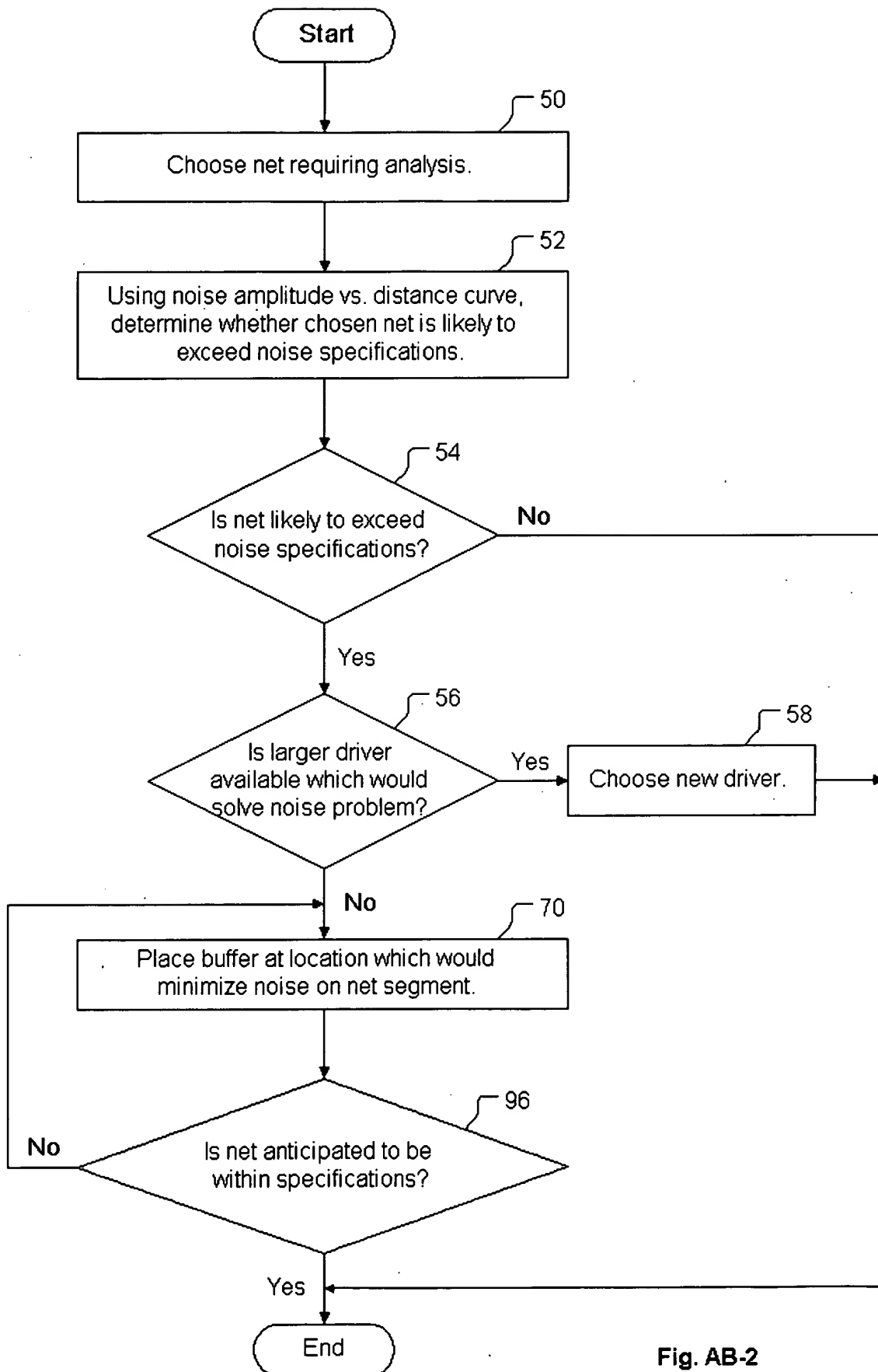


Fig. AB-2

VI. ISSUES

The issues presented in this appeal are whether the rejections under 35 U.S.C. §112, 35 U.S.C. §102, and 35 U.S.C. §103 of the claims under appeal are proper. The issues therefore are as follows:

- A. Are claims 1-2, 5-8, 14-15, 27-30, and 36-37 properly rejected under 35 U.S.C. §112, first paragraph, as not being supported by the specification to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention?
- B. Are claims 1-8, 14, 16-19, 25-30, 36, 38-41, and 47-48 properly rejected under 35 U.S.C. §102(b) as being anticipated by Petschauer et al. ("Petschauer") (U.S. Patent No.: 5,596,506)?
- C. Are claims 1-8, 14-17, 25, 27-30, 36-39, and 47 properly rejected under 35 U.S.C. §102(b) as being anticipated by Li et al. ("Li") ("A repeater optimization methodology for deep sub-micron, high-performance processors")?
- D. Are claims 1-8, 14, 16-17, 25, 27-30, 36, 38-39, and 47 properly rejected under 35 U.S.C. §103(a) as being unpatentable over [Alpert et al. ("Alpert") (U.S. Patent No.: 6,117,182) or Tawada (U.S. Patent No.: 6,405,350) or Jones et al. ("Jones") (U.S. Patent No.: 5,666,288) or Dwyer et al. ("Dwyer") (U.S. Patent No.: 6,341,365)] in view of [(Applicant's Own Admission) or Oh et al. ("Oh") ("A Scaling Scheme and Optimization Methodology for Deep Sub-Micron Interconnect") or Davis et al. ("Davis") ("Length, Scaling, and Material Dependence of Crosstalk between Distributed RC Interconnects") or Yang et al. ("Yang") ("Deep Submicron On-chip Crosstalk") or Petschauer or Li].?
- E. Are claims 15 and 37 properly rejected under 35 U.S.C. §103(a) as being unpatentable over [Alpert or Tawada or Jones or Dwyer] in view of [(Applicant's Own Admission) or Oh or Davis or Yang or Petschauer] in further view of Li.

VII. GROUPING OF THE CLAIMS

Applicants propose two groups of claims. The first group (Group I) includes claims 1-2, 5-8, 14-15, 27-30, and 36-37. The claims of the first group stand or fall together. The second group (Group II) includes claims 3-4, 16-17, 25, 38-39, and 47. The claims of the second group stand or fall together.

VIII. ARGUMENTS

- A. The specification does enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with claims 1-2, 5-8, 14-15, 27-30, and 36-37 (Group I).

Rejection

Applicant's claims 1-2, 5-8, 14-15, 27-30, and 36-37 (Group I) stand rejected under 35 U.S.C. §112, first paragraph, as not being enabled by the specification such that any person skilled in the art to which the specification pertains, or with which it is most nearly connected, can make and use the invention commensurate in scope with claims. These rejections are traversed.

Examiner's Position

The Examiner has stated that the specification is enabling for modifying a net to reduce a length of the net by inserting a buffer. However, the Examiner has asserted that the specification does not reasonably provide enablement for a broader teaching of modifying the net.

Applicant's Rebuttal

Claim 1 requires the following operation: "examining the noise amplitude versus length of conduction path curve associated with the driver to determine a modified total path

length of conductive paths coupled to the driver that corresponds to a modified noise level that is less than the maximum acceptable noise level."

Claim 1 also requires the following operation: "modifying the net to reduce the total path length of conductive paths coupled to the driver to be less than or equal to the modified total path length of conductive paths."

The Applicants submit that the specification, particular page 7, clearly describes examination of a noise amplitude versus length of conduction path curve for a driver to determine a length of conduction path connected to the driver at which the noise amplitude is less than a maximum acceptable noise amplitude. The specification further describes reducing the total length of conduction paths connected to the driver in order to achieve a noise amplitude that is less than the maximum acceptable noise amplitude, based on information gleaned from examination of the noise amplitude versus length of conduction path curve for the driver. The specification clearly describes an exemplary embodiment in which the total length of conduction paths connected to the driver is reduced to an acceptable amount by inserting another driver (i.e., buffer).

"When analyzing the enabled scope of a claim, the teachings of the specification must not be ignored because claims are to be given their broadest reasonable interpretation that is consistent with the specification." MPEP §2164.08 In the present case, the specification, particularly page 7, clearly teaches modification of the net by insertion of a driver to reduce the total length of conduction paths connected to an existing driver. Thus, the specification provides an example of how the net can be modified in accordance with the present invention. Hence, the specification is enabling with respect to modification of the net. Furthermore, the

Examiner has admitted that the specification is "enabling for modifying the net to reduce the length by inserting a buffer."

The Federal Circuit has repeatedly held that "the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without "undue experimentation." [emphasis added] *In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993). It should be appreciated that in the present case, the specification is clearly enabling with respect to modifying the net. The specification in this case provides a clear description of how the net can be modified through insertion of one or more buffers. Therefore, it is clear that the specification provides adequate enablement for modifying the net. Thus, the Applicants submit that in view of the disclosure of the specification, the operation of "modifying the net to reduce the total path length of conductive paths coupled to the driver to be less than or equal to the modified total path length of conductive paths" is sufficiently enabled to allow one of ordinary skill in the art to make and use the entire scope of the claimed invention without undue experimentation.

Claim 2 represents a computer readable media contained program instructions for performing the method of claim 1. Therefore, claim 2 includes the same limitations as claim 1, and is enabled by the specification for at least the same reasons as previously discussed with respect to claim 1. Also, each of claims 5-8 and 14-15 ultimately depends from claim 1, and thereby incorporates each feature of claim 1. Thus, with respect to modifying the net, each of claims 5-8 and 14-15 is enabled by the specification for at least the reasons previously discussed with respect to claim 1. Additionally, each of claims 27-30 and 36-37 ultimately depends from claim 2, and thereby incorporates each feature of claim 2. Thus, with respect to

modifying the net, each of claims 27-30 and 36-37 is enabled by the specification for at least the reasons provided for claim 2.

It should be further appreciated that each of dependent claims 7, 15, 29, and 37 further clarify modification of the net as including insertion of at least one buffer within the net. The Examiner has admitted that the specification is enabling for "modifying the net to reduce the length by inserting a buffer." Therefore, the Applicants submit that the Examiner is clearly in error, by his own admission, for including claims 7, 15, 29, and 37 within the group of claims rejected under 35 U.S.C. §112.

In view of the foregoing, the Board is respectfully requested to overrule the Examiner's rejections under 35 U.S.C. §112 of each of claims 1-2, 5-8, 14-15, 27-30, and 36-37.

- B. When considered under 35 U.S.C. §102, the teachings of Petschauer fail to anticipate claims 1-2, 5-8, 14-15, 27-30, and 36-37 (Group I).

Rejection

Applicant's claims 1-2, 5-8, 14-15, 27-30, and 36-37 stand rejected under 35 U.S.C. §102(b) as being anticipated by Petschauer. These rejections are traversed.

Examiner's Position

The Examiner has asserted that Petschauer discloses each and every feature of claims 1-2, 5-8, 14-15, 27-30, and 36-37, as required to support an anticipation rejection under 35 U.S.C. §102(b). The Examiner has relied upon Petschauer's disclosure of an integrated circuit chip fabrication method to teach each and every feature of the presently rejected claims. In addition to providing a broad reference to Figures 4-9, 25, and corresponding text of

Petschauer, the Examiner has also specifically cited the following method operations of Petschauer as teaching each and every element of the presently rejected claims:

- 1) providing a trial layout in the chip for a victim net and a set of aggressor nets which have segments that lie next to the victim net;
- 2) assigning to the trial layout of the victim net, the parameters of -- a line capacitance, a line resistance, and a driver output resistance; and assigning to the trial layout of each aggressor net, the parameters of -- a coupling capacitance to the victim net, and a voltage transition;
- 3) estimating, for each aggressor net, a respective peak crosstalk voltage V_p which the aggressor net couples into the victim net as a function $V_p = K(e^{-X} - e^{-Y})$ where K, X, and Y are products of said parameters;
- 4) modifying said trial layout and repeating the assigning and estimating steps until a summation of the estimated peak crosstalk voltages in the victim net is within an acceptable level; and
- 5) building the chip with the modified layout for which the summation is within the acceptable level.

Applicant's Rebuttal

With respect to independent claims 1 and 2, Petschauer does not teach or suggest at least the following features:

"examining a noise amplitude versus length of conduction path curve associated with the driver to determine a noise level associated with the total path length of conductive paths coupled to the driver," and

"examining the noise amplitude versus length of conduction path curve associated with the driver to determine a modified total path length of conductive paths coupled to the driver that corresponds to a modified noise level that is less than the maximum acceptable noise level."

The Applicants have thoroughly reviewed Figures 4-9, 25, and corresponding text of Petschauer, as applied by the Examiner to support the present anticipation rejections. The Applicants have determined that the above-cited features of independent claims 1 and 2 are simply not discussed or suggested in the disclosure of Petschauer. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Therefore, since Petschauer does not disclose each and every feature of independent claims 1 and 2, the Applicants submit that Petschauer does not anticipate independent claims 1 and 2. Furthermore, since each of dependent claims 5-8 and 14-15 ultimately depend from claim 1, the Applicants submit that Petschauer does not anticipate either of claims 5-8 and 14-15 for at least the same reasons discussed with respect to claim 1. Also, since each of dependent claims 27-30 and 36-37 ultimately depend from claim 2, the Applicants submit that Petschauer does not anticipate either of claims 27-30 and 36-37 for at least the same reasons discussed with respect to claim 2.

During prosecution of the present case, the Examiner has asserted that the Applicants are merely alleging that Petschauer does not contain the recited limitations. Furthermore, the Examiner has asserted that the Applicant's arguments do not clearly point out the patentable novelty of the claims in view of the cited art of record. Additionally, the Examiner has

asserted that the Applicants do not show how amendments to the claims avoid the cited art of record. Still further, the Examiner has asserted that the Applicants have not addressed the specifics of the rejections under 35 U.S.C. §102(b), including the cited passages in the cited art of record. The Applicants have repeatedly disagreed with all of the Examiner's assertions as stated above.

The Applicants submit that the burden is on the Examiner to specifically point out how the cited reference teaches each and every element and limitation of the claim being rejected under 35 U.S.C. §102(b). In the present case, the Examiner has provided a general explanation of the cited reference, but has repeatedly failed to explain in clear terms how the cited reference discloses each and every feature of the claims, particular the features relating to examining a noise amplitude versus length of conduction path curve associated with a driver.

The Applicants are not merely alleging that Petschauer does not contain the recited limitations of claims 1-2, 5-8, 14-15, 27-30, and 36-37. Rather, the Applicants factually submit that Petschauer (Figures 4-9, 25, and corresponding text) does not teach or suggest each and every feature of each of claims 1-2, 5-8, 14-15, 27-30, and 36-37.

The Applicants further submit that the Examiner has not specifically pointed out how Petschauer either expressly or inherently describes the features of claims 1-2, 5-8, 14-15, 27-30, and 36-37 as identified above. The passages of Petschauer as cited by the Examiner to provide support for the rejections under 35 U.S.C. §102(b) consists of a blanket reference to the eight figures (Figs. 4, 5A, 5B, 6, 7, 8, 9, and 25) and corresponding text, effectively spanning the entire Detailed Description of the Petschauer specification. The Examiner has not clearly pointed out how the cited art of record teaches each and every element and limitation of each claim as required to support a rejection under 35 U.S.C. §102(b). A blanket

referral to multiple figures and corresponding text of a reference, without providing further indication as to how specific elements and limitations of the rejected claims are taught or suggested by the reference, is equivalent to an omnibus rejection. The Examiner has been requested to specifically point out what portions of Petschauer are being asserted to teach each and every element and limitation of claims 1-2, 5-8, 14-15, 27-30, and 36-37. Additionally, the Examiner has been requested to specifically point out how the cited portions of Petschauer teach each and every element and limitation of claims 1-2, 5-8, 14-15, 27-30, and 36-37.

In view of the foregoing, the Board is respectfully requested to overrule the Examiner's rejections of claims 1-2, 5-8, 14-15, 27-30, and 36-37 under 35 U.S.C. §102(b).

- C. When considered under 35 U.S.C. §102, the teachings of Petschauer fail to anticipate claims 3-4, 16-17, 25, 38-39, and 47 (Group II).

Rejection

Applicant's claims 3-4, 16-17, 25, 38-39, and 47 stand rejected under 35 U.S.C. §102(b) as being anticipated by Petschauer. These rejections are traversed.

Examiner's Position

The Examiner has asserted that Petschauer discloses each and every feature of claims 3-4, 16-17, 25, 38-39, and 47, as required to support an anticipation rejection under 35 U.S.C. §102(b). The Examiner has relied upon the same portions of Petschauer's disclosure as previously described with respect to Argument B (Figures 4-9, 25, and corresponding text) to teach each and every feature of the presently rejected claims.

Applicant's Rebuttal

With respect to independent claims 3 and 4, Petschauer does not teach or suggest at least the following features:

"examining a first noise amplitude versus length of conduction path curve associated with the first driver to determine a first noise level associated with the total path length of conductive paths," and

"examining a second noise amplitude versus length of conduction path curve associated with a second driver to determine a second noise level associated with the total path length of conductive paths."

The Applicants have thoroughly reviewed Figures 4-9, 25, and corresponding text of Petschauer, as applied by the Examiner to support the present anticipation rejections. The Applicants have determined that the above-cited features of independent claims 3 and 4 are simply not discussed or suggested in the disclosure of Petschauer. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Therefore, since Petschauer does not disclose each and every feature of independent claims 3 and 4, the Applicants submit that Petschauer does not anticipate independent claims 3 and 4. Furthermore, since each of dependent claims 16-17 and 25 ultimately depend from claim 3, the Applicants submit that Petschauer does not anticipate either of claims 16-17 and 25 for at least the same reasons discussed with respect to claim 3. Also, since each of dependent claims 38-39 and 47 ultimately depend from claim 4, the Applicants submit that Petschauer does not anticipate either of claims 38-39 and 47 for at least the same reasons discussed with respect to claim 4.

During prosecution of the present case, the Examiner has asserted that the Applicants are merely alleging that Petschauer does not contain the recited limitations. Furthermore, the Examiner has asserted that the Applicant's arguments do not clearly point out the patentable novelty of the claims in view of the cited art of record. Additionally, the Examiner has asserted that the Applicants do not show how amendments to the claims avoid the cited art of record. Still further, the Examiner has asserted that the Applicants have not addressed the specifics of the rejections under 35 U.S.C. §102(b), including the cited passages in the cited art of record. The Applicants have repeatedly disagreed with all of the Examiner's assertions as stated above.

The Applicants submit that the burden is on the Examiner to specifically point out how the cited reference teaches each and every element and limitation of the claim being rejected under 35 U.S.C. §102(b). In the present case, the Examiner has provided a general explanation of the cited reference, but has failed to explain in clear terms how the cited reference discloses each and every feature of the claims, particular the features relating to examining a noise amplitude versus length of conduction path curve associated with a driver.

The Applicants are not merely alleging that Petschauer does not contain the recited limitations of claims 3-4, 16-17, 25, 38-39, and 47. Rather, the Applicants factually submit that Petschauer (Figures 4-9, 25, and corresponding text) does not teach or suggest each and every feature of each of claims 3-4, 16-17, 25, 38-39, and 47.

The Applicants further submit that the Examiner has not specifically pointed out how Petschauer either expressly or inherently describes the features of claims 3-4, 16-17, 25, 38-39, and 47 as identified above. The passages of Petschauer as cited by the Examiner to provide support for the rejections under 35 U.S.C. §102(b) consists of a blanket reference to

the eight figures (Figs. 4, 5A, 5B, 6, 7, 8, 9, and 25) and corresponding text, effectively spanning the entire Detailed Description of the Petschauer specification. The Examiner has not clearly pointed out how the cited art of record teaches each and every element and limitation of each claim as required to support a rejection under 35 U.S.C. §102(b). A blanket referral to multiple figures and corresponding text of a reference, without providing further indication as to how specific elements and limitations of the rejected claims are taught or suggested by the reference, is equivalent to an omnibus rejection. The Examiner has been requested to specifically point out what portions of Petschauer are being asserted to teach each and every element and limitation of claims 3-4, 16-17, 25, 38-39, and 47. Additionally, the Examiner has been requested to specifically point out how the cited portions of Petschauer teach each and every element and limitation of claims 3-4, 16-17, 25, 38-39, and 47.

In view of the foregoing, the Board is respectfully requested to overrule the Examiner's rejections of claims 3-4, 16-17, 25, 38-39, and 47 under 35 U.S.C. §102(b).

- D. When considered under 35 U.S.C. §102, the teachings of Li fail to anticipate claims 1-2, 5-8, 14-15, 27-30, and 36-37 (Group I).

Rejection

Applicant's claims 1-2, 5-8, 14-15, 27-30, and 36-37 stand rejected under 35 U.S.C. §102(b) as being anticipated by Li. These rejections are traversed.

Examiner's Position

The Examiner has asserted that Li discloses each and every feature of claims 1-2, 5-8, 14-15, 27-30, and 36-37, as required to support an anticipation rejection under 35 U.S.C. §102(b).

Applicant's Rebuttal

Li discloses a method for using repeaters to reduce propagation delays, improve slew rates, and reduce crosstalk effects. The method of Li is driven by three parameters: 1) propagation delay, 2) slew rate, and 3) crosstalk. The method of Li includes identifying an optimal repeater and wire segment based on propagation delay, slew rate, and the power dissipation. The method of Li also includes fine tuning the identified optimal repeater and wire segment by accounting for crosstalk.

Li does not mention a noise amplitude versus length of conduction path curve for a driver. Furthermore, Li does not teach or suggest at least the following features of independent claims 1 and 2:

"examining a noise amplitude versus length of conduction path curve associated with the driver to determine a noise level associated with the total path length of conductive paths coupled to the driver," and

"examining the noise amplitude versus length of conduction path curve associated with the driver to determine a modified total path length of conductive paths coupled to the driver that corresponds to a modified noise level that is less than the maximum acceptable noise level."

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Therefore, since Li does not disclose each and every feature of independent claims 1 and 2, the Applicants submit that Li does not anticipate independent claims 1 and 2. Furthermore, since each of dependent claims 5-8 and 14-15 ultimately depend from claim 1,

the Applicants submit that Li does not anticipate either of claims 5-8 and 14-15 for at least the same reasons discussed with respect to claim 1. Also, since each of dependent claims 27-30 and 36-37 ultimately depend from claim 2, the Applicants submit that Li does not anticipate either of claims 27-30 and 36-37 for at least the same reasons discussed with respect to claim 2.

In view of the foregoing, the Board is respectfully requested to overrule the Examiner's rejections of claims 1-2, 5-8, 14-15, 27-30, and 36-37 under 35 U.S.C. §102(b).

- E. When considered under 35 U.S.C. §102, the teachings of Li fail to anticipate claims 3-4, 16-17, 25, 38-39, and 47 (Group II).

Rejection

Applicant's claims 3-4, 16-17, 25, 38-39, and 47 stand rejected under 35 U.S.C. §102(b) as being anticipated by Li. These rejections are traversed.

Examiner's Position

The Examiner has asserted that Li discloses each and every feature of claims 3-4, 16-17, 25, 38-39, and 47, as required to support an anticipation rejection under 35 U.S.C. §102(b).

Applicant's Rebuttal

Li does not mention a noise amplitude versus length of conduction path curve for a driver. Furthermore, Li does not teach or suggest at least the following features of independent claims 3 and 4:

"examining a first noise amplitude versus length of conduction path curve associated with the first driver to determine a first noise level associated with the total path length of conductive paths," and

"examining a second noise amplitude versus length of conduction path curve associated with a second driver to determine a second noise level associated with the total path length of conductive paths."

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Therefore, since Li does not disclose each and every feature of independent claims 3 and 4, the Applicants submit that Li does not anticipate independent claims 3 and 4. Furthermore, since each of dependent claims 16-17 and 25 ultimately depend from claim 3, the Applicants submit that Li does not anticipate either of claims 16-17 and 25 for at least the same reasons discussed with respect to claim 3. Also, since each of dependent claims 38-39 and 47 ultimately depend from claim 4, the Applicants submit that Li does not anticipate either of claims 38-39 and 47 for at least the same reasons discussed with respect to claim 4.

In view of the foregoing, the Board is respectfully requested to overrule the Examiner's rejections of claims 3-4, 16-17, 25, 38-39, and 47 under 35 U.S.C. §102(b).

- F. When considered under 35 U.S.C. §103(a), the combined teachings of [Alpert, Tawada, Jones, or Dwyer] in view of [Applicant's Own Admission, Oh, Davis, Yang, Petschauer, or Li] do not render claims 1-2, 5-8, 14, 27-30, and 36 (of Group I) prima facie obvious.

Rejection

Applicant's claims 1-2, 5-8, 14, 27-30, and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over [Alpert, Tawada, Jones, or Dwyer] in view of [Applicant's Own Admission, Oh, Davis, Yang, Petschauer, or Li]. These rejections are traversed.

For clarification purposes, the combinations of references as cited above are delineated in the following listing:

1. Alpert in view of Applicant's Own Admission
2. Alpert in view of Oh
3. Alpert in view of Davis
4. Alpert in view of Yang
5. Alpert in view of Petschauer
6. Alpert in view of Li
7. Tawada in view of Applicant's Own Admission
8. Tawada in view of Oh
9. Tawada in view of Davis
10. Tawada in view of Yang
11. Tawada in view of Petschauer
12. Tawada in view of Li
13. Jones in view of Applicant's Own Admission
14. Jones in view of Oh
15. Jones in view of Davis
16. Jones in view of Yang
17. Jones in view of Petschauer
18. Jones in view of Li
19. Dwyer in view of Applicant's Own Admission
20. Dwyer in view of Oh
21. Dwyer in view of Davis

22. Dwyer in view of Yang

23. Dwyer in view of Petschauer

24. Dwyer in view of Li

Examiner's Position

The Examiner has argued that the present invention as recited in each of claims 1-2, 5-8, 14, 27-30, and 36 would have been obvious to one of ordinary skill in the art at the time of the invention given the teachings of the cited art as combined above. More specifically, the Examiner has argued that the cited art as combined above teaches two techniques for solving the crosstalk noise problem: 1) increasing the driver strength, and 2) inserting buffers when the conductors are too long. The Examiner has also stated that the Applicant's arguments are not persuasive because they have not addressed the cited teachings associated with the two techniques for solving the crosstalk noise problem.

Applicant's Rebuttal

Claims 1 and 2 are independent claims, and claims 5-8, 14, 27-30, and 36 are dependent claims which each depend from one of claims 1 and 2. Since a dependent claim is by definition patentable if its respective independent claim is patentable, the arguments to follow with respect to the rejections under 35 U.S.C. §103(a) are directed toward demonstrating how independent claims 1 and 2 are patentable over the cited art of record.

The Applicants acknowledge the teachings associated with the two techniques for solving the crosstalk noise problem as identified by the Examiner. However, the two techniques for solving the crosstalk noise problem as identified by the Examiner are not fully representative of the present invention, as recited in each of claims 1 and 2, when considered as a whole.

With respect to claims 1 and 2, the Examiner's entire basis of rejection under 35 U.S.C. §103(a) is directed toward the following element:

"modifying the net to reduce the total path length of conductive paths coupled to the driver to be less than or equal to the modified total path length of conductive paths."

In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983). Therefore, the Examiner must consider all features of the claimed invention. Furthermore, "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

The Applicants have thoroughly reviewed the teachings of each combination of cited art as identified above and have not found any teaching or suggestion of the following features of claims 1 and 2, particularly when combined with the other claim features:

"examining a noise amplitude versus length of conduction path curve associated with the driver to determine a noise level associated with the total path length of conductive paths coupled to the driver" and

"examining the noise amplitude versus length of conduction path curve associated with the driver to determine a modified total path length of conductive paths coupled to the driver that corresponds to a modified noise level that is less than the maximum acceptable noise level."

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580

(CCPA 1974). The above-identified features of claims 1 and 2, associated with examining a noise amplitude versus length of conduction path curve associated with the driver, are neither taught nor suggested by the combined cited art of record as applied by the Examiner. Furthermore, the Applicants have repeatedly requested the Examiner to specifically point out how either of the applied combinations of cited art teach or suggest the above-identified features of claims 1 and 2. The Examiner has failed to respond.

The Applicants submit that each of the 24 combinations of references applied against claims 1 and 2 are inadequate with respect to teaching or suggesting all of the claimed features, as required to establish prima facie obviousness. Also, the Applicants submit that Examiner has failed to establish how at least 1 of the 24 combinations of references clearly teaches or suggests all elements recited in each of claims 1 and 2. The Applicants further submit that the large number (24) of applied reference combinations is indicative of the weakness of each reference combination when considered independently.

The Examiner has asserted that the Applicant's arguments amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguish them from the cited art of record. In view of the foregoing arguments, which have been presented to the Examiner during prosecution of the present case, the Applicants simply disagree with this assertion by the Examiner.

The Examiner has alleged a number of admissions by the Applicants. Nevertheless, none of the alleged admissions by the Applicants amount to an admission of the above-identified features of claims 1 and 2, associated with examining a noise amplitude versus length of conduction path curve associated with the driver, that are distinctly absent within each of the applied combinations of cited art. With respect to each of claims 1 and 2, it should

be appreciated that the patentable novelty of the present invention resides in the combination of all recited features.

The Examiner's argument relating to the two techniques for solving the crosstalk noise problem, as taught by the cited art of record, is not sufficient to establish a prima facie case of obviousness with respect to each of claims 1 and 2. The Applicants have specifically and repeatedly pointed out to the Examiner the above-identified features of claims 1 and 2, associated with examining a noise amplitude versus length of conduction path curve associated with the driver, that are neither taught nor suggested by the cited art of record. Furthermore, the Applicants have repeatedly pointed out to the Examiner that the patentability of the present invention lies not only in the claimed features that are not taught or suggested by the cited art of record, but also in the combination of claimed features when considered as a whole.

The Examiner has stated that the "Applicants have not addressed the specifics of the rejections, including the cited passages in the asserted prior art." The Applicants respectfully disagree with this statement. The Examiner has provided a summary of the teachings of each of the following references: Alpert, Tawada, Jones, Dwyer, Oh, Davis, Yang, Petschauer and Li. However, in correlating the summarized teachings of the cited art of record to the claims, the Examiner has only asserted that the two techniques for solving the crosstalk noise, i.e., 1) increasing the driver strength and 2) inserting buffers when the conductors are too long, are taught by the cited art of record. The Examiner has not identified how the teachings of the cited art of record correspond to the other elements and limitations of the claims, as previously discussed. The Applicants respectfully submit that the specifics of the rejections have been addressed and that the cited passages in the art of record as applied by the Examiner are not

sufficient to establish prima facie obviousness of claims 1 and 2. Also, the Applicants are only required to respond to cited passages in the asserted prior art as necessary to refute the Examiner's attempt to establish prima facie obviousness of the claimed invention.

In view of the foregoing arguments, the Applicants submit that the Examiner has failed to establish a prima facie case of obviousness against each of claims 1 and 2. Also, since each of claims 5-8, 14, 27-30, and 36 ultimately depends from one of claims 1 and 2, the Examiner has also failed to establish a prima facie case of obviousness against each of claims 5-8, 14, 27-30, and 36.

Therefore, the Board is respectfully requested to overrule the Examiner's rejections of claims 1-2, 5-8, 14, 27-30, and 36 under 35 U.S.C. §103(a).

- G. When considered under 35 U.S.C. §103(a), the combined teachings of [Alpert, Tawada, Jones, or Dwyer] in view of [Applicant's Own Admission, Oh, Davis, Yang, Petschauer, or Li] do not render claims 3-4, 16-17, 25, 38-39, and 47 (Group II) prima facie obvious.

Rejection

Applicant's claims 3-4, 16-17, 25, 38-39, and 47 stand rejected under 35 U.S.C. §103(a) as being unpatentable over [Alpert, Tawada, Jones, or Dwyer] in view of [Applicant's Own Admission, Oh, Davis, Yang, Petschauer, or Li]. These rejections are traversed.

The same combinations of references as cited above are delineated for clarification purposes in the previous discussion associated with Argument F.

Examiner's Position

The Examiner has argued that the present invention as recited in each of claims 3-4, 16-17, 25, 38-39, and 47 would have been obvious to one of ordinary skill in the art at the time of the invention given the teachings of the cited art as combined above. More

specifically, the Examiner has argued that the cited art as combined above teaches two techniques for solving the crosstalk noise problem: 1) increasing the driver strength, and 2) inserting buffers when the conductors are too long. The Examiner has also stated that the Applicant's arguments are not persuasive because they have not addressed the cited teachings associated with the two techniques for solving the crosstalk noise problem.

Applicant's Rebuttal

Claims 3 and 4 are independent claims, and claims 16-17, 25, 38-39, and 47 are dependent claims which each depend from one of claims 3 and 4. Since a dependent claim is by definition patentable if its respective independent claim is patentable, the arguments to follow with respect to the rejections under 35 U.S.C. §103(a) are directed toward demonstrating how independent claims 3 and 4 are patentable over the cited art of record.

The Applicants acknowledge the teachings associated with the two techniques for solving the crosstalk noise problem as identified by the Examiner. However, the two techniques for solving the crosstalk noise problem as identified by the Examiner are not fully representative of the present invention, as recited in each of claims 3 and 4, when considered as a whole.

With respect to claims 3 and 4, the Examiner's entire basis of rejection under 35 U.S.C. §103(a) is directed toward the following element:

"replacing the first driver with the second driver."

In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983). Therefore, the Examiner

must consider all features of the claimed invention. Furthermore, "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

The Applicants have thoroughly reviewed the teachings of each combination of cited art as identified above and have not found any teaching or suggestion of the following features of claims 3 and 4, particularly when combined with the other claim features:

"examining a first noise amplitude versus length of conduction path curve associated with the first driver to determine a first noise level associated with the total path length of conductive paths," and

"examining a second noise amplitude versus length of conduction path curve associated with a second driver to determine a second noise level associated with the total path length of conductive paths."

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). The above-identified features of claims 3 and 4, associated with examining a noise amplitude versus length of conduction path curve associated with the driver, are neither taught nor suggested by the combined cited art of record as applied by the Examiner. Furthermore, the Applicants have repeatedly requested the Examiner to specifically point out how either of the applied combinations of cited art teach or suggest the above-identified features of claims 3 and 4. The Examiner has failed to respond.

The Applicants submit that each of the 24 combinations of references applied against claims 3 and 4 are inadequate with respect to teaching or suggesting all of the claimed features, as required to establish prima facie obviousness. Also, the Applicants submit that

Examiner has failed to establish how at least 1 of the 24 combinations of references clearly teaches or suggests all elements recited in each of claims 3 and 4. The Applicants further submit that the large number (24) of applied reference combinations is indicative of the weakness of each reference combination when considered independently.

The Examiner has asserted that the Applicant's arguments amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguish them from the cited art of record. In view of the foregoing arguments, which have been presented to the Examiner during prosecution of the present case, the Applicants simply disagree with this assertion by the Examiner.

The Examiner has alleged a number of admissions by the Applicants. Nevertheless, none of the alleged admissions by the Applicants amount to an admission of the above-identified features of claims 3 and 4, associated with examining a noise amplitude versus length of conduction path curve associated with the driver, that are distinctly absent within each of the applied combinations of cited art. With respect to each of claims 3 and 4, it should be appreciated that the patentable novelty of the present invention resides in the combination of all recited features.

The Examiner's argument relating to the two techniques for solving the crosstalk noise problem, as taught by the cited art of record, is not sufficient to establish a prima facie case of obviousness with respect to each of claims 3 and 4. The Applicants have specifically and repeatedly pointed out to the Examiner the above-identified features of claims 3 and 4, associated with examining a noise amplitude versus length of conduction path curve associated with the driver, that are neither taught nor suggested by the cited art of record. Furthermore, the Applicants have repeatedly pointed out to the Examiner that the patentability

of the present invention lies not only in the claimed features that are not taught or suggested by the cited art of record, but also in the combination of claimed features when considered as a whole.

The Examiner has stated that the "Applicants have not addressed the specifics of the rejections, including the cited passages in the asserted prior art." The Applicants respectfully disagree with this statement. The Examiner has provided a summary of the teachings of each of the following references: Alpert, Tawada, Jones, Dwyer, Oh, Davis, Yang, Petschauer and Li. However, in correlating the summarized teachings of the cited art of record to the claims, the Examiner has only asserted that the two techniques for solving the crosstalk noise, i.e., 1) increasing the driver strength and 2) inserting buffers when the conductors are too long, are taught by the cited art of record. The Examiner has not identified how the teachings of the cited art of record correspond to the other elements and limitations of the claims, as previously discussed. The Applicants respectfully submit that the specifics of the rejections have been addressed and that the cited passages in the art of record as applied by the Examiner are not sufficient to establish prima facie obviousness of claims 3 and 4. Also, the Applicants are only required to respond to cited passages in the asserted prior art as necessary to refute the Examiner's attempt to establish prima facie obviousness of the claimed invention.

In view of the foregoing arguments, the Applicants submit that the Examiner has failed to establish a prima facie case of obviousness against each of claims 3 and 4. Also, since each of claims 16-17, 25, 38-39, and 47 ultimately depends from one of claims 3 and 4, the Examiner has also failed to establish a prima facie case of obviousness against each of claims 16-17, 25, 38-39, and 47.

Therefore, the Board is respectfully requested to overrule the Examiner's rejections of claims 3-4, 16-17, 25, 38-39, and 47 under 35 U.S.C. §103(a).

- H. When considered under 35 U.S.C. §103(a), the combined teachings of [Alpert, Tawada, Jones, or Dwyer] in view of [Applicant's Own Admission, Oh, Davis, Yang, or Petschauer] in further view of Li do not render claims 15 and 37 (of Group II) prima facie obvious.

Rejection

Applicant's claims 15 and 37 stand rejected under 35 U.S.C. §103(a) as being unpatentable over [Alpert, Tawada, Jones, or Dwyer] in view of [Applicant's Own Admission, Oh, Davis, Yang, or Petschauer] in further view of Li. These rejections are traversed.

Examiner's Position

The Examiner has asserted that the various combinations of cited art applied against each of claims 15 and 37 are sufficient to render each of claims 15 and 37 prima facie obvious.

Applicant's Rebuttal

Claim 15 ultimately depends from claim 1. Therefore, claim 15 is patentable for at least the same reasons as previously discussed with respect to claim 1 in Argument F. Claim 37 ultimately depends from claim 2. Therefore, claim 37 is patentable for at least the same reasons as previously discussed with respect to claim 2 in Argument F.

Therefore, the Board is respectfully requested to overrule the Examiner's rejections of claims 15 and 37 under 35 U.S.C. §103(a).


I. Conclusion

In view of the inappropriateness of the 35 U.S.C. §112, §102, and §103 rejections, as discussed in the Applicant's aforementioned arguments, the Applicants submit that the presently claimed invention is patentable over the cited art of record.

The Applicants respectfully request the Board to consider each group of claims (Group I and Group II) separately with respect to the teachings of the cited art of record.

In sum, the Applicants submit that the Examiner's rejections are in error, and respectfully request that the Board of Appeals and Interferences reverse the Examiner's rejections of the claims on appeal.

Respectfully Submitted,
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